

WHAT IS CLAIMED IS:

1 1. A heat and moisture exchanger for selectively conducting a stream of air produced
2 by a ventilator through a moisturizing medium or causing the stream of air to bypass the
3 moisturizing medium, the heat and moisture exchanger comprising:

4 (a) a housing having a ventilator-side port configured to be coupled to an
5 outlet of a ventilator and a source of aerosolized medication, the housing also having a patient-
6 side port configured to be coupled to a patient to provide ventilation to the patient;

7 (b) a structure within the housing forming a first path within the housing for
8 conducting non-aerosolized air from the ventilator-side port through the moisturizing medium to
9 the patient-side port and a second path within the housing for conducting air carrying aerosolized
10 medication from the ventilator-side port to the patient-side port by bypassing the moisturizing
11 medium; and

12 (c) a two-way valve mechanism in the housing for selectively coupling the
13 ventilator-side port into fluid communication with one or the other of the first and second paths.

1 2. The heat and moisture exchanger of claim 1 including an external valve control
2 extending through the housing for controlling the two-way valve mechanism.

1 3. The heat and moisture exchanger of claim 2 wherein the structure includes a tube
2 located between the ventilator-side port and the patient-side port, the second path extending
3 entirely through the tube, wherein the two-way valve mechanism selectively blocks or opens a
4 portion of the second path extending through the tube in response to the external valve control,
5 the moisturizing medium being disposed between an outer surface of the tube and an inner
6 surface of the housing, the first path extending around the tube and through the moisturizing
7 medium.

1 4. The heat and moisture exchanger of claim 3 including a gap between a first end of
2 the tube and the ventilator-side port, the gap forming part of the first path.

1 5. The heat and moisture exchanger of claim 3 wherein the two-way valve
2 mechanism includes a valve post having an upper end portion extending through the housing and

3 attached to the external valve control and a lower end portion extending through a wall of the
4 tube, and wherein the two-way valve mechanism also includes a butterfly valve vane located in
5 the tube and attached to the lower end portion of the valve post.

1 6. The heat and moisture exchanger of claim 5 wherein the tube includes an
2 elongated slot for admitting the valve post and the butterfly valve vane.

1 7. The heat and moisture exchanger of claim 3 wherein the moisturizing medium is
2 annular and is disposed around the tube, an inner surface of the moisturizing medium forming a
3 seal with an outer surface of the tube, an outer surface of the moisturizing medium forming a seal
4 with an inner surface of the housing.

1 8. The heat and moisture exchanger of claim 7 wherein the tube and the housing are
2 cylindrical, and wherein the inner surface and outer surface of the moisturizing medium are
3 cylindrical.

1 9. The heat and moisture exchanger of claim 3 wherein the housing includes a
2 ventilator-side section and a patient-side section which are fit together as a unit to form the
3 housing.

1 10. The heat and moisture exchanger of claim 3 wherein the ventilator-side section
2 includes a plurality of integral support members which support the tube in axial alignment
3 between the ventilator-side port and the patient-side port.

1 11. The heat and moisture exchanger of claim 4 wherein the first end of the tube
2 extends beyond the two-way valve mechanism toward the ventilator-side port, the housing
3 forming a volume within which an antibacterial and viral filter can be disposed in the first path.

1 12. The heat and moisture exchanger of claim 1 including a gas sampling port for
2 providing fluid communication with the interior of the housing.

1 13. A method for conducting a stream of air produced by a ventilator through a
2 moisturizing medium contained within a heat and moisture exchanger and selectively bypassing
3 the moisturizing medium to conduct aerosolized medication in the stream from a ventilator-side
4 port of the heat and moisture exchanger through a patient-side port thereof, the method
5 comprising:

6 (a) providing an internal bypass path within the heat and moisture exchanger to
7 bypass the moisturizing medium;

8 (b) providing a two-way valve within the heat and moisture exchanger to selectively
9 block the internal bypass path;

10 (c) operating an external valve control to cause the two-way valve to open the internal
11 bypass path;

12 (d) introducing medication particles into the stream of air produced by the ventilator
13 to produce aerosolized medication in the stream, wherein the stream flows from the ventilator-
14 side port through the internal bypass path and the patient-side port; and

15 (e) after the aerosolized medication has passed through the patient-side port,
16 operating the external valve control to cause the two-way valve to block the internal bypass path,
17 wherein the stream of air produced by the ventilator flows from the ventilator-side port through

18 the moisturizing medium and the patient-side port.